

Lightweight Inflatable Structural Airlock (LISA), Phase I

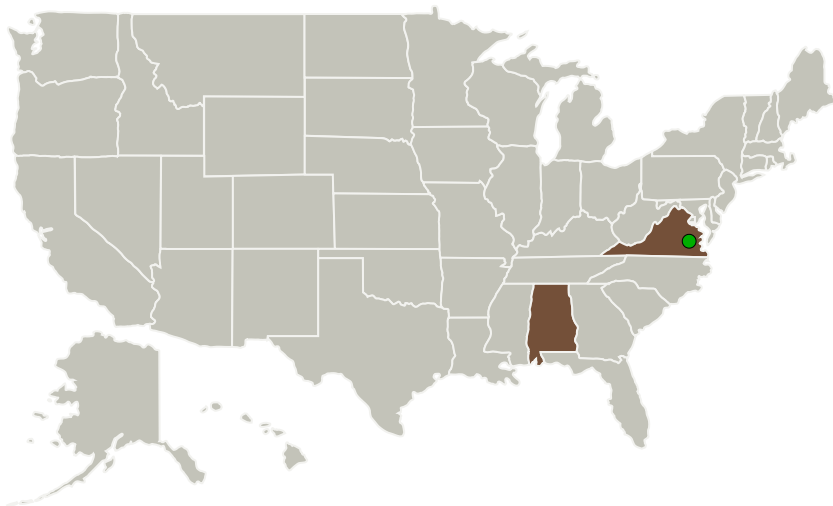
Completed Technology Project (2015 - 2015)



Project Introduction

Innovative light-weight airlock technologies are required to integrate with any deep space and surface platform hosting Extra-Vehicular Activity (EVA). The CFD Research Corporation (CFDRC) team proposes an inflatable airlock structure that employs unique fabric architecture capable of delivering the lowest mass and greatest versatility of any competing design. The proposed fabric inflatable airlock design features a completely integrated air beam inter-wall to passively generate the wall stiffness required for airlock depressurization—without the mass and bulk of aluminum pressure hulls or complexity of multi-structure adaptations of competing inflatable habitat architectures. The design is a modification of Thin Red Line Aerospace's (TRLA) patented Ultra High Performance Pressure Vessel (UHPV), the only fabric pressure vessel design with fully determinate load paths which allows for true mass optimization. This unique architecture utilizes a matrix of braided fiber tendons to contain the structure's global pressure loads. The underlying woven fabric and gas barrier envelopes are thereby only exposed to minimal local shell loads where they bulge outwards between adjacent tendons. Working in pure tension in the absence of load coupling, the tendon array architecture has been shown to be statically determinate and auto-stabilizing under extreme deflection. The proposed fabric inflatable airlock stows compactly for transport to the habitat further reducing logistic costs.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
CFD Research Corporation	Lead Organization	Industry	Huntsville, Alabama
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations

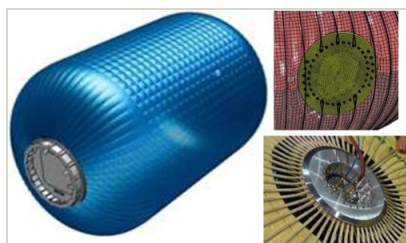
Alabama	Virginia
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Project Transitions

**June 2015:** Project Start**December 2015:** Closed out**Closeout Summary:** Lightweight Inflatable Structural Airlock (LISA), Phase I Project Image**Closeout Documentation:**

- Final Summary Chart Image(<https://techport.nasa.gov/file/139034>)

Images

**Briefing Chart Image**

Lightweight Inflatable Structural Airlock (LISA), Phase I
(<https://techport.nasa.gov/image/129122>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

CFD Research Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Essam Sheta

Co-Investigator:

Essam Sheta

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Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
 - └ TX06.1 Environmental Control & Life Support Systems (ECLSS) and Habitation Systems
 - └ TX06.1.4 Habitation Systems

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System